WATERPROOF FOOTWEAR CONSTRUCTION

BACKGROUND OF THE INVENTION

1. Filed of the Invention

[0001] The invention relates to footwear construction and in particular, to waterproof footwear constructed in accordance with an Opanka technique.

2. Description of the Related Prior

[0002] Opanka technique usually refers to the way in which footwear's uppers is stitched to a footwear outsole and/or midsole. Inside, padded insoles create a comfortable environment for the wearer's feet. Although typically used to construct casual and heavy-duty footwear, the Opanka technique has gained broader use, becoming one of the most popular techniques in the footwear industry.

[0003] Regardless of the shoe construction technique, it is desirable that the footwear be light weight, comfortable, durable and protective. In particular, the protective aspect may include, among others, a waterproof characteristic of footwear. While the footwear constructed in accordance with the Opanka technique meets many of the above listed and other standard requirements, the stitching of footwear components often compromises the footwear's resistance to water leakage.

[0004] Exemplification of this problem may be found in footwear prepared in accordance with the Opanka technique as disclosed in U.S. Patent 6,574,886. This patent discloses footwear in which an upper, defining a volume for receiving a wearer's foot, is directly handstitched to the midsole of a shoe. Regardless of improved sealants, such as glues and

waterproof cements, that are intended to seal stitch holes formed during stitching, it is not unusual for water to penetrate inside the upper through the stitched midsole and outsole

[0005] It is therefore desirable to provide footwear constructed in accordance with the Opanka technique and having improved waterproof characteristics without, however, sacrificing the comfort and elegance associated with the footwear assembled in accordance with this technique.

SUMMARY OF THE INVENTION

[0006] This objective is attained by footwear assembled generally in accordance with the Opanka technique and provided with a waterproof structure, which is configured to have a layer of waterproof material contiguous with and extending upwards from an outsole and juxtaposed with the inner surface of an upper.

[0007] In accordance with one inventive aspect, the footwear is configured with the upper having a bottom portion and the outsole formed with an upper edge having a water barrier wall. This water barrier wall is configured to overlap a portion of the bottom portion of the upper, which is adjacent to the outsole's upper edge. Coupling the overlapped portion of the upper and the water barrier wall to one another allows the footwear to exhibit improved waterproof characteristics. Thus, the water barrier wall prevents water penetration through footwear midsole into a volume defined by the upper.

[0008] In accordance with a further inventive aspect, the water barrier wall of the upper edge of the outsole is constructed in a non-uniform manner. Particularly, this wall is higher along the foot areas known to have increased flexibility than along its other areas. As a consequence, the inner flank is configured to provide a water barrier wall for foot

regions that otherwise would be most probably exposed to water penetration during walking.

[0009] It is therefore an object of the invention to provide footwear having improved waterproof characteristics.

[00010] A further object of the invention is to provide a method for constructing footwear having the improved waterproof characteristics.

[00011] A still further object of the invention is to provide a footwear that maintains the improved waterproof characteristics.

BRIEF DESCRIPTION OF THE DRAWINGS

[00012] The above and other objects, features and advantages will become more readily apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

[00013] FIG. 1 is an exploded view of footwear constructed in accordance with the invention;

[00014] FIG. 2 is a partially sectioned view of the inventive footwear of FIG. 1;

[00015] FIG. 3 is a cross-sectional view of the inventive footwear taken along lines III-III of FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[00016] Referring to FIGS. 1-3, footwear 10 is configured of a few components including, among others, an upper 12 and an outsole 14 which are coupled together in a manner minimizing water penetration into the interior of the footwear. In conventional footwear construction using the Opanka technique, an interface 42 (FIG. 2) between the

upper 12 and the outsole 14 is stitched along seams 30 (FIG. 1). Such footwear may be prone to water leakage for a variety of reasons. One of the reasons may be attributed to the presence of stitch holes in the seams 30. Yet another reason is substantial flexing forces imposed upon the interface 42 by the wearer. Additionally, the waterproof characteristics depend on the quality of and a method of applying a sealant used during the construction of the footwear.

[00017] To minimize the vulnerability of the interface 42 of the present invention to water penetration, the outsole 14 is constructed with a relatively high water barrier wall 22 (FIGS. 1-3) and made of material including, among others, resin, waterproof leather, plastic and/or any other materials known to resist water penetration,. Incorporation of the water barrier wall 22 in the outsole 14 provides an obstacle for water. Equally important for the waterproof purposes is the configuration of the water barrier wall 22. As shown in FIGS. 1-3, the water barrier wall 22 extends upwards from the outsole 14 and overlaps a bottom portion 50 of inner surface 44 (FIG. 2) of the upper 12. Thus, the portion of the upper 12 and the water barrier wall 22 constitute a two-layer water-resistant structure that is not punctured by stitching. Preferably, the water barrier wall 22 is continuous. However, depending on the particular design of the inventive footwear, it may be configured to extend only along a portion of the outsole's periphery.

[00018] Turning to FIGS. 1 and 3, the outsole 14 is molded with an outsole wall 36 having, in turn, an upper edge 38, which runs around the entire periphery of the outsole 14. The upper edge 38 is defined between the water barrier wall 22 and a lip 80, spaced outwards from the water barrier wall, and is dimensioned to receive a bottom edge 48 of the upper 12 running substantially parallel to the upper edge. Accordingly, as shown in

FIG. 3, the upper edge 38 has the water barrier wall 22, the lip 80 and a bottom area 34 bridging the upper edge and the water barrier wall. Alternatively, the lip 80 may be constructed to extend flush with the bottom area 34, wherein the upper edge 38 and the water barrier wall 22 form an L-shape. Regardless of the shape of the upper edge 38, the water barrier wall 22 overlaps an inner side 60 of the bottom portion 50 of the upper 12, which extends upwards from its bottom edge 48, and is stitchlessly coupled therewith, as explained herein below.

[00019] Coupling the upper 12 to the outsole 14 is accomplished in accordance with the Opanka technique. The outsole 14 is formed with a plurality of channels each having a respective pair of opposite ends, one of which opens at 52 to the exterior of the outsole wall 36 and the other at 54 to the exterior of the bottom area 34, respectively. Bottom edge 48 of the upper 12 is formed with a series of holes 58 which, upon juxtaposition of the upper 12 with the outsole 14, are aligned with the holes 54 of the outsole. Guiding a thread 56 through the holes 58 of the upper and the channels of the outsole secures the upper 12 to the outsole 14. Tools configured to stitch the thread 56 are known in the art and can be selected in accordance with the requirements imposed by a given footwear design.

[00020] In accordance with a further object of the invention, a waterproof sealant 32 is provided between the inner side 60 of the upper and the water barrier wall 22 improving coupling between the upper 12 and the outsole 14 and, concomitantly, the water resistant characteristics of the footwear 10. Preferably the waterproof sealant 32 includes a semi-liquid waterproof cement, which melts in response to heat- and/or pressure-treatment. As a result, the activated sealant 32 flows across the upper edge 38

of the outsole and bonds the bottom portion 50 of the upper to the water barrier wall 22 and the bottom edge 48 of the upper to the bottom area 34 of the outsole. Flowability of the melting cement 32 allows the latter to penetrate and plug the stitched holes 52, 54 and 58, thereby improving the waterproof characteristic of the footwear 10.

[00021] The water barrier wall 22 may be variously dimensioned depending on the type of the footwear 10, but preferably is between 0.5-1.5mm thick. As a consequence, an absolute lowest water-penetration point 62 of the upper 12 (FIG. 3) is raised at a height corresponding to the water barrier wall 22. Preferably, this water-penetration point 62 is approximately 10-20 mm above the point where the upper 12 is stitched to the bottom of the upper edge 38 of the outsole 14.

[00022] In accordance with still a further aspect of the invention, the height of the water barrier wall 22 is not uniform and preferably varies in accordance with the anatomical structure of the foot. As is known, the ball area of the foot typically experiences the highest flexing loads. As a consequence, the water barrier wall 22 has raised regions 28 (FIG. 1) to compensate for the deformation of the outsole, which is typically manifested by the reduced height of the outsole wall 36 during walking.

[00023] Returning to FIG. 1, the footwear 10, in addition to the upper 12 and outsole 14, is further configured to have a midsole or filler 16 placed in a cavity 40 of the outsole 14 and delimited by the water barrier wall 22. Preferably, the midsole 16 is made from flexible material including, but not limited to, ethylene vinyl acetate (EVA) or other synthetic rubbers. A few slits 66 formed in the forefoot area are configured to further improve the flexibility of the midsole 16. To reinforce central areas of the midsole 16, its bottom side has a recess shaped and dimensioned to receive a fiberglass shank 20.

[00024] Placed between the midsole 16 and the upper 12 is an insole 18, which, as shown in FIG. 1, is ergonomically configured to have a non-uniform thickness 68 that preferably gradually reduces towards the front, or forefoot area, of the footwear.

[00025] The forefoot area of the upper 12 is formed with a Strobel lining 70 (FIG. 2) attached along the inner surface 44 of the upper except for its bottom area 72, where the upper and the Strobel lining are separated by the water barrier wall 22. The components of the footwear 10 can be coupled to one another, as known in the art.

[00026] The present invention is not limited the embodiments described above, but encompasses any and all embodiments and equivalents within the scope of the following claims.